

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (currently amended) A method of amplifying a 5kb or longer subsequence of a target nucleic acid in an aqueous solution using a polymerase chain reaction, the method comprising:

(i) contacting the target nucleic acid with a polymerase protein comprising ~~at least~~ two heterologous domains, wherein a first domain that is a sequence-non-specific double-stranded nucleic-acid-binding domain that comprises an amino acid sequence that has at least 75% identity to the amino acid sequence of SEQ ID NO:2 is joined to a second domain that is a polymerase domain with error-correcting activity, where the sequence non-specific double-stranded nucleic-acid-binding domain enhances the processivity of the polymerase domain compared to an identical polymerase domain not having the sequence non-specific double-stranded nucleic acid binding domain; and

~~— (a) binds to double stranded nucleic acid, and~~

~~— (b) enhances the processivity of the polymerase compared to an identical polymerase not having the sequence non-specific nucleic acid binding domain fused to it, and~~

wherein the solution is of a composition that permits the sequence non-specific double-stranded nucleic acid binding domain to bind to the target nucleic acid and the polymerase domain to extend a primer that is hybridized to the target nucleic acid sequence to a length of 5 kb or longer;

(ii) incubating the solution using a polymerase chain reaction temperature profile that amplifies the 5 kb or longer subsequence.

2. (currently amended) A method of claim 1, wherein the ~~nucleic acid-modifying~~ polymerase domain has thermally stable polymerase activity.

3. (currently amended) A method of claim 1, wherein the ~~nucleic acid~~
polymerase-modifying domain comprises a *Pyrococcus* polymerase domain.

4. (currently amended) A method of claim 1, wherein the sequence-non-specific double-stranded nucleic-acid-binding domain specifically binds to polyclonal antibodies generated against ~~either Sae7d or Sso7d~~.

5. (currently amended) A method of claim 1 wherein the sequence-non-specific double-stranded nucleic-acid-binding domain ~~contains a 50 amino acid subsequence~~
containing 50% amino acid similarity to Sso7D has at least 85% identity to SEQ ID NO:2

6. (currently amended) A method of claim 1 wherein the sequence-non-specific double-stranded nucleic-acid-binding domain has at least 90% identity to SEQ ID NO:2
~~specifically binds to polyclonal antibodies generated against Sso7d.~~

7. (currently amended) A method of claim 1 wherein the sequence-non-specific double-stranded nucleic-acid-binding domain ~~is Sso7d~~ comprises the amino acid
sequence of SEQ ID NO:2.

8. (currently amended) A method of amplifying a subsequence of a target nucleic acid in an aqueous solution using a polymerase chain reaction, the method comprising:
contacting the target nucleic acid with a polymerase protein comprising ~~at least~~
~~two heterologous domains, wherein a first domain that is a sequence-non-specific~~ double-
stranded nucleic-acid-binding domain that comprises an amino acid sequence that has at least
75% identity to the amino acid sequence of SEQ ID NO:2 is joined to ~~a second domain that is a~~
polymerase domain with error-correcting activity, where the sequence non-specific nucleic-acid-binding domain enhances the processivity of the polymerase domain compared to an identical
polymerase domain not having the sequence non-specific double-stranded nucleic acid binding
domain; and

~~—— (a) binds to double stranded nucleic acid, and~~
~~—— (b) enhances the processivity of the polymerase compared to an identical polymerase not having the sequence non-specific nucleic acid binding domain fused to it, and~~

wherein the solution comprises 10^5 or fewer copies/ml of the target nucleic acid and is of a composition that permits the sequence non-specific double-stranded nucleic acid binding domain to bind to the target nucleic acid and the polymerase domain to extend a primer that is hybridized to the target nucleic acid sequence;

(ii) incubating the solution using a polymerase chain reaction temperature profile that amplifies the subsequence.

9. (currently amended) A method of claim 8 wherein the polymerase nucleic acid modifying domain has thermally stable polymerase activity.

10. (currently amended) A method of claim 8 wherein the polymerase nucleic acid modifying domain comprises a *Pyrococcus* polymerase domain.

11. (currently amended) A method of claim 8 wherein the sequence-non-specific double-stranded nucleic-acid-binding domain specifically binds to polyclonal antibodies generated against ~~either Sac7d or Sso7d~~.

12. (currently amended) A method of claim 8 wherein the sequence-non-specific double-stranded nucleic-acid-binding domain has at least 85% identity to SEQ ID NO:2 ~~contains a 50 amino acid subsequence containing 50% amino acid similarity to Sso7D~~.

13. (currently amended) A method of claim 8 wherein the sequence-non-specific double-stranded nucleic-acid-binding domain has at least 90% identity to SEQ ID NO:2 ~~specifically binds to polyclonal antibodies generated against Sso7d~~.

14. (currently amended) A method of claim 8, wherein the sequence-non-specific double-stranded nucleic-acid-binding domain is ~~Sso7d~~ comprises the amino acid sequence of SEQ ID NO:2.

15. (new) A method of amplifying a target nucleic acid in an aqueous solution, the method comprising:

(i) contacting the target nucleic acid with a polymerase comprising a sequence non-specific double-stranded nucleic acid binding domain joined to a polymerase domain, wherein the sequence non-specific double-stranded nucleic acid binding domain comprises an amino acid sequence that has at least 75% identity to the amino acid sequence of SEQ ID NO:2, where the presence of the sequence non-specific double-stranded nucleic acid binding domain enhances the processivity of the polymerase domain compared to an identical polymerase domain not having the sequence non-specific double-stranded nucleic acid binding domain; and

wherein the solution is of a composition that permits the sequence non-specific double-stranded nucleic acid binding domain to bind to the target nucleic acid and the polymerase domain to extend a primer that is hybridized to the target nucleic acid sequence;

(ii) incubating the solution such that the primer is extended, thereby amplifying the target nucleic acid.

16. (new) A method of claim 15, wherein the sequence-non-specific double-stranded nucleic-acid-binding domain has at least 85% identity to SEQ ID NO:2

17. (new) A method of claim 15, wherein the sequence-non-specific double-stranded nucleic-acid-binding domain has at least 90% identity to SEQ ID NO:2.

18. (new) A method of claim 15, wherein the sequence-non-specific double-stranded nucleic-acid-binding domain comprises the amino acid sequence of SEQ ID NO:2.

19. (new) A method of claim 15, wherein the polymerase domain comprises a family A polymerase domain

20. (new) A method of claim 15, wherein the polymerase domain comprises a family B polymerase domain.

21. (new) A method of claim 15, wherein the polymerase domain is thermostable.

22. (new) A method of claim 15, wherein the polymerase domain is a *Thermus* polymerase domain or a *Pyrococcus* polymerase domain.

23. (new) A method of claim 15, wherein the sequence non-specific double-stranded nucleic acid binding domain comprises an amino acid sequence that has at least 75% sequence identity to the Sac7d sequence set forth in amino acids 7-71 of SEQ ID NO:10.

24. (new) A method of claim 21, wherein the sequence non-specific double-stranded nucleic acid binding domain comprises an amino acid sequence that has at least 85% sequence identity to the Sac7d sequence set forth in amino acids 7-71 of SEQ ID NO:10.

25. (new) A method of claim 22, wherein the sequence non-specific double-stranded nucleic acid binding domain comprises an amino acid sequence that has at least 90% sequence identity to the Sac7d sequence set forth in amino acids 7-71 of SEQ ID NO:10

26. (new) A method of claim 15, wherein the sequence non-specific nucleic-acid-binding domain is Sac7d.